

REMARKS

The Office Action mailed January 4, 2011 has been reviewed and carefully considered. No new matter has been added.

Claims 1, 13, 25-26, 28-31, 34, and 37 have been amended. Claims 1-37 are pending.

Initially, Applicants acknowledge the Examiner's indication of allowable subject matter. In particular, Claims 7, 8, 19, 20, 31, and 32 are indicated as containing potentially allowable subject matter if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if the rejections with respect to 35 U.S.C. 101 and/or 35 U.S.C. 112 are successfully resolved.

Claims 1-24 and 37 stand rejected under 35 U.S.C. 101 as being allegedly directed to non-statutory subject matter. Of Claims 1-24 and 37, Claims 1, 13, and 37 are independent Claims. Claims 1 and 37 are directed to respective methods, and Claim 13 is directed to a video encoder.

Claim 1 has been amended to now recite the following (emphasis added):

1. In a video encoder having a processor, a video encoding method for encoding a current macroblock of an inter-coded frame, the method comprising at least one of:

...a

wherein the method further comprises encoding the current macroblock using the selected mode for the current macroblock.

Moreover, Claim 13 has been amended to now recite the following (emphasis added):

13. A video encoder having a processor for encoding a current macroblock of an inter-coded frame, the encoder comprising the processor and at least one of:

...a

wherein the encoder further comprises means for encoding the current macroblock using the selected mode for the current macroblock.

Further, Claim 37 has been amended to now recite the following (emphasis added):

37. In a video encoder having a processor, a video encoding method for encoding a macroblock of an inter-coded frame, the method comprising:
...; and
encoding the macroblock using the selected mode.

Support for the preceding amendments (as well as the amendment to Claim 25 described below) may be found at least at Figure 1, output of VLC 140, page 6, lines 14-28, and page 12, lines 11-23 of the instant application.

Regarding method Claims 1 and 37, in *Bilski v. Kappos*, 561 U.S. ____ (2010), the United States Supreme Court stated that the machine-or-transformation text is a “useful and important clue” and “investigative tool” for determining whether some claimed methods are statutory processes. According to the machine or transformation text, a process may be deemed statutory under 35 U.S.C. 101 if the process is (1) tied to another statutory category, or (2) transforms underlying subject matter to a different state or thing.

Accordingly, Claim 1 recites, *inter alia*, “In a video encoder having a processor, a video encoding method for encoding a current macroblock of an inter-coded frame” (emphasis added). Moreover, Claim 37 recites, *inter alia*, “In a video encoder having a processor, a video encoding method for encoding a macroblock of an inter-coded frame” (emphasis added). Thus, method Claims 1 and 37 recite that such respective methods are performed in a video encoder and, hence, are tied to the statutory class of apparatus in that regard, thus satisfying the first prong of the machine or transformation test set forth in *Bilski*. Additionally, methods Claims 1 and 37 also recite that such video encoders have (comprise) a processor which is clearly a hardware device and, hence, are also tied to the statutory class of apparatus in that regard, thus further satisfying the first prong of the machine or transformation test set forth in *Bilski*.

Moreover, regarding Claim 13, the same recites and, hence, is explicitly directed to “A video encoder” (emphasis added). Additionally, Claim 13 also recites that such video encoder has (comprises) a processor, which is clearly a hardware device.

Thus, regarding Claims 1 and 37, the methods of these claims are described as being explicitly performed in a video encoder having a processor and, regarding Claim 13, the same is explicitly directed to a video encoder having a processor. As such, we respectfully point out that one of ordinary skill in this and related arts would readily recognize that a video encoder having a processor would necessarily involve hardware, essentially a machine having at the least the recited processor. Any other interpretation lacking at least some hardware would ultimately result in an inoperable device, as there is no getting around the fact that some form of processor and memory are required for any encoder implementation to be operational.

Further regarding Claims 1, 13, and 37, we note that as per MPEP 2111.02(I), “[a]ny terminology in the preamble that limits the structure of the claimed invention must be treated as a claim limitation”. Further, we note that page 6, lines 19-21 of the instant application disclose that “[t]he functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing software in association with appropriate software” (emphasis added). It is quite evident from simply the preceding sentence alone, that any video encoder embodiment will necessarily involve hardware in all cases, as all cases described in that sentence involve hardware.

Additionally, we note that each of Claims 1, 13, and 37 inherently include an input, namely the current macroblock of an inter-coded frame which is explicitly recited in each of Claims 1, 13, and 37. Moreover, each of Claims 1, 13, and 37 as now amended further include an output, namely the encoded (current) macroblock. As such, the Examiner’s position regarding Claims 1, 13, and 37 lacking inputs and outputs is respectfully believed to be incorrect and nonetheless moot in view of the above described amendments.

Hence, given the explicit recitation of “video encoder” in Claims 1, 13, and 37 and in consideration of all of the preceding, it is respectfully asserted that Claims 1, 13, and 37 do in fact recite statutory subject matter in satisfaction of 35 U.S.C. 101.

Accordingly, Claims 1, 13, 37 are believed to satisfy the requirements of 35 U.S.C. 101 for at least the preceding reasons. As Claims 2-12 and 14-24 directly or indirectly depend from Claims 1 and 13, respectively, Claims 2-12 and 14-24 are believed to satisfy the requirements of 35 U.S.C. 101 for at least the reasons set forth above regarding Claims 1, 13, and 25. Thus, reconsideration of the rejection is respectfully requested.

While not rejected under 35 U.S.C. 101, Claim 25 was nonetheless amended to now recite, *inter alia*, “wherein the method further comprises encoding the current macroblock using the selected mode for the current macroblock”. Such amendment was made for consistency sake regarding Claims 1 and 13.

Claims 26, 28-32, and 34 stand rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Accordingly, Claims 26, 28-31, and 34 have been amended to remove the limitation “the signal data” there from. Thus, in view of the preceding, each of Claims 26, 28-31, and 34 are believed to be clear and definite in particularly pointing out and distinctly claiming the subject matter which applicant regards as the invention in satisfaction of the requirements of 35 U.S.C. 112, second paragraph. Claim 32 depends from Claim 31 and is believed to satisfy the requirements of 35 U.S.C. 112, second paragraph, in the same manner as Claim 31. Thus, reconsideration of the rejection is respectfully requested.

In the pending Office Action, Claims 1, 2, 4-6, 9-14, 16-18, 21-26, 28-30, and 33-37 stand rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent Publication No. 2004/0218674 to Kondo et al. (hereinafter “Kondo”). Claims 3, 15, and 27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kondo in view of U.S. Patent Publication No. 2003/0099292 to Wang et al. (hereinafter “Wang”).

The independent claims in the instant application are Claims 1, 13, 25, and 37.

It is respectfully asserted that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claim 1:

- checking first modes for a subset of macroblock modes, selectively checking other modes in response to motion vector information of the checked first modes, and selecting the mode for the current macroblock in response to the checked modes;

- checking the macroblock mode of at least one neighboring macroblock, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock;

checking the cost of a subset of macroblock modes, further checking only intra-coded modes if the checked cost meets a preset criteria, and selecting the mode for the current macroblock in response to the checked modes; and
adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met....

Moreover, it is respectfully asserted that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claim 13:

first means for checking the first modes for a subset of macroblock modes, selectively checking other modes in response to motion vector information of the checked first modes, and selecting the mode for the current macroblock in response to the checked modes;

macroblock means for checking the macroblock mode of at least one neighboring macroblock, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock;

subset means for checking the cost of a subset of macroblock modes, further checking only intra-coded modes if the checked cost meets a preset criteria, and selecting the mode for the current macroblock in response to the checked modes; and

stopping means for adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met....

Further, it is respectfully asserted that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claim 25:

checking first modes for a subset of macroblock modes, selectively checking other modes in response to motion vector information of the checked first modes, and selecting the mode for the current macroblock in response to the checked modes;

checking the macroblock mode of at least one neighboring macroblock, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock;

checking the cost of a subset of macroblock modes, further checking only intra-coded modes if the checked cost meets a preset criteria, and selecting the mode for the current macroblock in response to the checked modes; and

adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met....

Also, it is respectfully asserted that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claim 37:

selecting a subset of macroblock modes for encoding;
comparing said subset of macroblock modes for coding efficiency; and
selecting a mode having favorable coding efficiency, responsive to said step of comparing modes.

We will now address the limitations in Claims 1, 13, and 25 directed to the first step/means for recited therein. Against the step of/means for “checking first modes for a subset of macroblock modes”, the Examiner cited paragraphs [0046]-[0047] of Kondo. Against the step of/means for “selectively checking other modes in response to motion vector information of the checked first modes”, the Examiner cited paragraph [0048] of Kondo. We respectfully disagree with the Examiner’s reading of Kondo.

Paragraphs [0046]-[0048] of Kondo simply describe the coding of a B-picture (noting the last sentence in paragraph [0045] disclosing that “[c]oding of the picture B8 will be explained step

by step”). In particular, paragraph [00046] discloses that up to two reference pictures may be used to encode the B-picture from among five pictures, paragraph [0047] discloses that switches are enabled or disabled depending upon if the B picture is used as a reference for other pictures, and paragraph [00048] discloses that forward and backward motion vectors of each block included in a macroblock are detected using the decoded picture data of the five pictures. Hence, at the onset, we note that paragraphs [0046]-[0048] are directed to the coding of a B-picture, and while such coding of a B-picture may involve one or more macroblock modes (Kondo, para. [0049]), no specific macroblock modes are mentioned at all in paragraphs [0046]-[0048]. Thus, none of paragraphs [0046]-[0048] involve checking first modes for a subset of macroblock modes or selectively checking other modes in response to motion vector information of the checked first modes, as explicitly recited in Claims 1, 13, and 25. That is, while paragraph [0049] may make mention of different macroblock modes that may be used to code a B-picture, neither paragraph [0049] nor preceding paragraphs [0046]-[0048] disclose “checking first modes for a subset of macroblock modes”, let alone and in addition “selectively checking other modes in response to motion vector information of the checked first modes” as recited in Claims 1, 13, and 25 as a particular way of encoding the B-picture.

Rather, the approach of Kondo appears similar to that of the prior art, which basically involves checking all available modes (see, e.g., Kondo, para. [0049], disclosing “[h]ere, the coding mode of macroblocks in a B-picture can be selected from among intra picture coding, inter picture prediction coding using one forward reference picture, inter picture prediction coding using two forward reference pictures, inter picture prediction coding using one backward reference picture, inter prediction coding using one backward reference picture, inter picture prediction coding using two backward reference pictures, and inter picture prediction coding using bi-directional motion vectors, *for example*”) (emphasis added to show that the list is intended to be exhaustive and, thus, not limiting (e.g., to a subset)). For example, we note that there is no limiting of the modes to be checked in Kondo, for example, such as to a subset as recited in Claims 1, 13, and 25. Additionally, we further note that there is no casual relationship disclosed in Kondo where other modes are selectively checked in response to motion vector information of the checked first modes as recited in Claims 1, 13, and 25).

Thus, Kondo fails to teach or suggest the limitations related to the first step/means for recited in Claims 1, 13, and 25.

We will now address the limitations in Claims 1, 13, and 25 directed to the second step/means for recited therein. Against the step/means for “checking the macroblock mode of at least one neighboring macroblock”, the Examiner cited paragraphs [0053]-[0054] and paragraph 57, lines 1-4 of Kondo. Against the step/means for “selecting the mode of the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock”, the Examiner cited paragraphs [0060]-[00061] of Kondo. We respectfully disagree with the Examiner’s reading of Kondo.

Paragraphs [0053]-[0054] of Kondo simply disclose that motion vectors used in the coding mode selected by the mode selecting unit are stored, and paragraph [0057], lines 1-4 simply disclose a first method wherein a predicted motion vector is generated by selecting only the motion vectors which refer to the same reference picture as the motion vector of the current block, from the motion vectors for the neighboring blocks.

However, a motion vector as disclosed in Kondo is not a macroblock mode as recited in Claims 1, 13, and 25. For example, a motion vector is a result of the motion estimation process, and is a two-dimensional vector that provides an offset from the coordinates of a (current) block in a (current) picture to be encoded with respect to the coordinates of a reference block in a reference picture. In contrast, a macroblock mode or simply a mode is a way of encoding an image block which can be, for example, but is not limited to, intra mode, inter mode, SKIP mode, DIRECT mode, etc. We note that some macroblocks modes do not even involve motion vectors. Moreover, we note that some modes involve partition sizes (e.g., INTER_16x8, INTER_8x8, etc.).

However, the only criteria specified for the first method of Kondo is that motion vectors referring to the same reference picture are selected from the motion vectors for the neighboring blocks. A reference picture, which is the selection criteria for the first method of Kondo, is not a mode, nor does referring to the same reference picture necessarily connote a particular mode.

Thus, checking reference pictures referred to by motion vectors for neighboring blocks as disclosed by Kondo (or even checking motion vectors themselves for that matter) is not the same as checking the macroblock mode of at least one neighboring macroblock as recited in Claims 1, 13, and 25. Moreover, in view of the preceding, Kondo cannot disclose “selecting the mode of the

current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock” as recited in Claims 1, 13, and 25, since Kondo instead checks the reference pictures (and NOT the macroblock mode) referred to by the motion vectors for the neighboring blocks and selects the motion vectors (and NOT the macroblock mode) of the neighboring blocks in response to such motion vectors pointing to the same reference picture as the motion vector of the current block. That is, we note that Kondo simply uses the same criteria of checking the reference pictures and if a match exists between the reference picture pointed to by the motion vector of the current block and the respective reference picture(s) pointed to by the respective motion vector(s) of the respective neighboring block(s), then that motion vector(s) of the respective neighboring block(s) is selected and used to obtain the motion vector of the current block (where motion vector averaging is used when more than one match exists). Thus, even if a neighboring block is ultimately coded as an intra block in Kondo (see, e.g., Kondo, para. [0060]), the approach used by Kondo is the same, that is one based on checking reference pictures and then motion vectors in response to the checked reference pictures, none of which are macroblock modes as recited in Claims 1, 13, and 25.

Thus, Kondo fails to teach or suggest the limitations related to the second step/means for recited in Claims 1, 13, and 25.

We will now address the limitations in Claims 1, 13, and 25 directed to the third step/means for recited therein. Against the step of/means for “checking the cost of a subset of macroblock modes”, the Examiner cited paragraph [0060] of Kondo. Against the step of/means for “further checking only intra-coded modes if the checked cost meets a preset criteria”, the Examiner cited paragraph [0060], lines 8-11 of Kondo. We respectfully disagree with the Examiner’s reading of Kondo.

Paragraph [0060] of Kondo does not specifically check the cost of any macroblock mode, let alone a subset of macroblock modes as recited in Claims 1, 13, and 25. Rather, paragraph [0060] simply notes that “exceptional processing” may be performed for blocks for which motion vectors have already been computed but such blocks are nonetheless coded as intra blocks or in direct mode. Moreover, paragraph [0060] simply notes that since motion vectors are automatically generated for each of blocks B, C, and D, if one or more of such blocks is an intra block or coded in direct mode, then the respective motion vectors for that one or more blocks are considered to be zero. However, a zero motion vector is not necessary an intra mode (e.g., it can be the result of

direct mode), and paragraph [0060] is not disclosing to further check only intra-coded modes if the checked cost (again, none determined, only superficially and generally noted) meets a preset criteria, but is instead simply noting that the resultant motion vector for the current block is affected by the motion vector of the neighboring block (e.g., if two of blocks B, C, and D are intra blocks or coded in direct mode, the motion vectors of the remaining block are used as predicted vectors, versus the motion vectors of all of blocks B, C, and D if none are intra blocks or are coded in direct mode).

Thus, Kondo fails to teach or suggest the limitations related to the third step/means for recited in Claims 1, 13, and 25.

We will now address the limitations in Claims 1, 13, and 25 directed to the fourth step/means for recited therein. Against the step/means for “adjusting an early-stopping threshold in response to checked macroblock modes”, the Examiner cited paragraph [0060] of Kondo. Against the step/means for “selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met”, the Examiner cited paragraph [0060] of Kondo. We respectfully disagree with the Examiner’s reading of Kondo.

Paragraph [0060] of Kondo has no bearing on early-stopping and, in fact, teaches away from the same. Although a teaching away argument is not germane to a rejection under 35 U.S.C. 102, it does show that Kondo is completely unrelated to the claimed limitations. For example, not only does Kondo determine the motion vectors of each of the neighboring blocks, but such motion vectors are always determined even if they are not later used (i.e., because the neighboring blocks for which the such motion vectors are generated are coded as intra blocks or in direct mode) as explicitly disclosed in cited paragraph [0060]. Hence, if anything, the cited approach of Kondo can be considered a too-late-to-stop approach, since it is too late to stop and actually gain anything at that point since all the work has already been done determining the motion vectors even if the motion vectors are not actually used. Also, as mentioned above, paragraph [0060] of Kondo is directed to further describing previously cited paragraph [0060], lines 1-4, which are directed to checking reference pictures and then in response thereto selecting motion vectors, none of which are macroblock modes as recited in Claims 1, 13, and 25.

Thus, Kondo fails to teach or suggest the limitations related to the fourth step/means for recited in Claims 1, 13, and 25.

We will now address the limitations in Claim 37.

Against “selecting a subset of macroblock modes for encoding”, the Examiner cited paragraph [0055] of Kondo. Against “comparing said subset of macroblock modes for coding efficiency”, the Examiner cited paragraphs [0060] and [0063] of Kondo. We respectfully disagree with the Examiner’s reading of Kondo.

For example, and as already noted above, paragraph [0060] of Kondo is directed to determining a motion vector and does not select macroblock modes, let alone a subset of macroblock modes. A motion vector is not a macroblock mode. Moreover, we point to previously cited paragraph [0049] of Kondo, which discloses that while the coding mode of macroblocks is determined using the motion vectors detected by the motion vector detecting unit 108, the coding mode can nonetheless be selected from a plurality of modes including intra picture coding and so forth without any explicit limiting of such modes to a subset. Rather, all modes appear to be considered, which is why “exceptional processing” may be performed for a block for which a motion vector is calculated but where the block is nonetheless coded as an intra block (i.e., Kondo, para. [0060]).

Regarding “comparing said subset of macroblock modes for coding efficiency” and paragraphs [0060] and [0063], we note that paragraph [0060] discloses that the motion vectors of each of the neighboring blocks are determined, with such motion vectors always determined even if they are not later used (i.e., because the neighboring blocks for which the such motion vectors are generated are coded as intra blocks or in direct mode). Thus, Kondo does not select a subset of macroblock modes as recited in Claim 37, but rather seems to use all modes while simply noting that exceptional processing is performed when a motion vector is determined (for coding a corresponding block as an inter block) and then such motion vector is not used because the corresponding block is coded as an intra block or in direct mode.

In any event, no comparison of a subset of macroblock modes is actually performed regarding paragraph [0060] or paragraph [0063]. Rather, both paragraphs relate to various ways to code motion vectors and not to comparing macroblock modes or a subset thereof. As noted above, a motion vector is not a macroblock mode. Moreover, we further note with respect to the “exceptional processing” mentioned in paragraph [0060] that the same relates to combining various coding approaches, in particular intra and inter, and essentially performing two disparate approaches

only to wind up using one of them while noting that performing both incurs extra (exceptional) processing is not a comparison at all between a subset of macroblock modes, but rather is a general statement that when you do more (i.e., perform extra modes), more processing is required.

Thus, Kondo fails to teach or suggest all the limitations recited in Claim 37.

Regarding each of Claims 1, 13, 25, and 27, we note that Wang does not cure the deficiencies of Kondo, and is silent regarding the same. To that end, we note that Wang was only cited against Claims 3, 15, and 27.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP §2131, citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

The failure of an asserted combination to teach or suggest each and every feature of a claim remains fatal to an obviousness rejection under 35 U.S.C. § 103. Section 2143.03 of the MPEP requires the "consideration" of every claim feature in an obviousness determination. To render a claim unpatentable, however, the Office must do more than merely "consider" each and every feature for this claim. Instead, the asserted combination of the patents must also teach or suggest *each and every claim feature*. See *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) (emphasis added) (to establish *prima facie* obviousness of a claimed invention, all the claim features must be taught or suggested by the prior art). Indeed, as the Board of Patent Appeal and Interferences has recently confirmed, a proper obviousness determination requires that an Examiner make "a searching comparison of the claimed invention - *including all its limitations* - with the teaching of the prior art." See *In re Wada and Murphy*, Appeal 2007-3733, citing *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis in original). "If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious" (MPEP §2143.03, citing *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)).

Accordingly, Claims 1, 13, 25, and 37 are patentably distinct and non-obvious over the cited references for at least the reasons set forth above.

Claims 2-12 directly or indirectly depend from Claim 1 and, thus, includes all the elements of Claim 1. Claims 14-24 directly or indirectly depend from Claim 13 and, thus, includes all the

elements of Claim 13. Claims 26-36 directly or indirectly depend from Claim 25 and, thus, includes all the elements of Claim 10. Accordingly, Claims 2-12 are patentably distinct and non-obvious over the cited references for at least the reasons set forth above with respect to Claim 1, Claims 14-24 are patentably distinct and non-obvious over the cited references for at least the reasons set forth above with respect to Claim 13, and Claims 26-36 are patentably distinct and non-obvious over the cited references for at least the reasons set forth above with respect to Claim 25.

Thus, reconsideration of the rejections is respectfully requested.

In view of the foregoing, Applicants respectfully request that the rejection of the claims set forth in the Office Action of January 4, 2011 be withdrawn, that pending claims 1-37 be allowed, and that the case proceed to early issuance of Letters Patent in due course.

No fee is believed due with regard to the filing of this amendment. However, if a fee is due, please charge Deposit Account No. 07-0832.

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